

## **PICTURE FRAME WITH INTEGRATED LIGHTING**

This application claims priority to US provisional application serial number 60/469110.

### **Field of the Invention**

5 The present invention relates to a picture frame with a light source integrated within the frame. More specifically, this invention relates to an assembly of a frame containing artwork where the artwork is located within a frame that includes one or more light sources located above the at one or more sides. The light source(s) illuminate the picture from the periphery of the artwork to effectively enhance and highlight the artwork. An ambient light sensor may also be provided to regulate the illumination intensity from the light source.

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### **Background of the Invention**

It is desirable to illuminate artwork that is on display in a home, gallery or museum. When artwork is being shown, the intent is to show the artwork with the best light possible to enhance the viewing experience. Most artwork is illuminated from light that is present in the room. This light can come from a variety of sources such as overhead fluorescent or incandescent lights. The light may also come from a skylight or from a window. Often this type of lighting does not provide lighting that is consistent or evenly illuminates the artwork without shadows from the frame. Another common method of illuminating artwork is to attach a light near or on one side of the frame and shine the light directly onto the surface of the artwork. This method brings the light source closer to the artwork and reduces shadows caused by the frame, but the use of this type of supplemental light sources is often cumbersome, bulky and may distract from the artwork. In addition, the installation of this type of lighting requires tools, and if the lighting is located over a piece of artwork that is sold, the new artwork may require the relocating of the light source. The external light source may also produce heat that may discolor or damage the artwork.

A number of inventions have been patented that illuminate artwork by lighting the artwork externally or from the back of the artwork. U.S. Patent Number 6,526,682 issued to Lee provides a lighting surface that the artwork can be attached. The light or illuminate surface remains attached to the wall. The artwork is placed into the frame. The lighting source from this invention comes from the back portion of the frame and illuminates the artwork from the back of the frame. While this method of illuminating the artwork will provide some lighting to the artwork, it does not provide direct lighting to top surface of the artwork. In addition, this type of lighting is not integrated within the frame of the artwork, but is part of a separate frame structure that is interchangeable with different pieces of artwork.

Other methods of lighting artwork are designed for use with opaque or transparent artwork. U.S. Patent Number 5,899,012 issued to Crum describes a frame consisting of a back sub assembly that includes a shadow box containing an integrated light source. The light source shines through a light-diffusion sheet that provides more even lighting. The artwork is then placed in front of the diffusion sheet and the artwork is illuminated when the light is turned on. This type of light source works only with artwork where the light can shine through the image. The lighting system may create additional heat that may cause deterioration to the

artwork if heat builds up in the shadow box. In addition, if the artwork is thick or is not a consistent thickness, like a painting, the illumination may not be seen in some locations.

5 U.S. Patent Number 6,027,235 issued to Chen shows a number plate holder intended for use with a car license plate. This patent has a number of lights positioned around the frame, and powered by a car's electrical system. The lights can be illuminated by the car's running lights or the cars break lights. While this patent has lights around the perimeter of the license plate, it is not intended to illuminate artwork or a picture, it requires a power source that is external from the frame, and the intensity of the lights are not directly regulated by ambient light.

10 What is needed is a frame for a picture where the lighting is integrated within the sides of the frame, and lighting is provided directly to the top surface of the artwork. The ideal invention would also include a light sensor that can provide varying degrees of illumination based upon the natural lighting.

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### **Brief Summary of the Invention**

It is an object of the present invention to provide a product that provides lighting to artwork or a picture when sufficient ambient light is not present. Additional light within the frame will illuminate the picture or painting without requiring external lighting. The invention is intended for any type of artwork or pictures for both table frames and wall frames. The invention consists of one or more light sources located in a frame that shine light onto the artwork or picture. LED's or other light-generating devices that are thin enough to use in a standard thickness frame can be used as a light source. When the light source is provided with LED's there is minimal heat that is generated with the illumination. The LED's may also be connected to a light sensor that can detect the presence of ambient light and can illuminate at varying intensities based upon changing ambient light conditions in the room where the artwork or picture is located. The LED's that are used to provide lighting to the picture or artwork require far less power to operate and can be powered by batteries that may be integrated inside the picture frame, thus making the invention entirely integrated with in the frame.

Additional options may include a solar charging circuit that can charge the batteries with ambient light and provide illumination when the ambient room lighting is less than acceptable. Because the light source is located within the frame, external lighting fixtures that distract from the artwork are eliminated. When one or more light sources are located on the periphery of the frame, an entire new version of artwork may be created that can take advantage of the shadows that may be caused by light being blocked or used by artwork that may be 3D in nature. Numerous advantages for this invention are not present in frames and lighting methods that are currently in use. These advantages include providing lights of different colors at various parts of the frame that show patterns and or cast different colors onto the artwork. The frame itself may be an entire new type of artwork that can include flashing lights and color that can enhance and add to the picture or artwork within the frame. There is an enormous difference between lighting artwork or a picture that is not found from lighting a picture where the light is located behind the picture or outside the frame or illuminating artwork or a picture from a light source that is integrated within the frame.

**Brief Description of the Several Views of the Drawing(s)**

Figure 1 is an isometric view of the invention.

Figure 2 is an electrical schematic of the invention.

Figure 3 is a cross sectional view of the invention.

5      Figure 4 is the invention in an oval frame with multiple light sources.

### **Detailed Description of the Invention**

Referring now to the accompanying drawings, the features of the invention will now be explained and will show that the present invention provides an innovative technique for illuminating a framed picture with the illumination being integrated within the frame.

5           Figure 1 shows a view of the invention as it might appear on a desk, on the wall of a house, studio, gallery or art show. The frame shown may also have a stand or a flat portion on the bottom of the frame so the picture can rest on a desk. In this figure item 10 is the frame structure. The frame is shown here in a square configuration. The frame can be rectangular, round, oval, or multiple sided. The frame may also be a free form shape that is unique, or  
10 conforms to the shape of the artwork that is placed inside the frame. The frame can be made from a variety of materials including plastics, metals, or wood. The frame may be made from a transparent or semi-transparent material where the light can illuminate both the artwork and the frame. In the preferred embodiment, the frame is made from wood or composite material that would hold a standard or conventional picture or piece of artwork. From figure 1, the frame has  
15 the appearance of a standard picture frame that can be purchased from a variety of sources. The size and shape of the frame is not the unique part of the invention. Item 40 represents artwork or a picture that may be installed in the frame. The artwork can be a variety of types including paintings, posters, pictures or any variety of items that would be framed. The item being framed may not be artwork, like a letter, sporting event tickets, diploma, baseball card or other item(s).

20           Referring to item 20 in figure 1, a single light source is shown that emits light onto the picture. This figure shows only one light source, but multiple light sources can be used that provide light along one side of the frame or from multiple sides of the frame. In the preferred embodiment the light source is an LED and more preferred a white LED. The LED is used because batteries can operate an LED, and an LED provides light with little or no heat. An LED  
25 also has a long life expectancy. Other light source are contemplated that would provide equivalent illumination of the artwork or picture. These light sources include florescent, incandescent, or other light generating sources. The frame may be configured using fiber optics, or light pipes so the light from a single light source can be used to provide light to a variety of locations around the frame. The frame may also include mirrors around the inside perimeter of  
30 the frame so light can be reflected back onto the artwork or picture. Lights of different colors may be placed around the frame and they may be illuminated at different times to provide a

pattern. The lights may be connected to a microphone or sound sensor, and different lights may be illuminated based upon the frequency or volume of the sound. If the artwork is 3D in nature, the lights may be configured to cast shadows on the artwork if the artwork itself blocks some of the light.

5           Item **30** in figure 1, is a light sensor that is capable of controlling the intensity of the light source item **20**. In this embodiment, the light source is a cadmium cell that changes resistance based upon the intensity of light. The light sensor could also be a photocell, phototransistor or silicon solar cell. When there is sufficient light in the room and the artwork is well illuminated from natural light in the room the light sensor will turn off the light on the artwork. As the room  
10           darkens, the sensor will increase the intensity of the illumination until the light source is at full brightness. It should be noted that the location of the light sensor is positioned so light from the frame does not shine directly onto the sensor and cause a flashing effect. The electrical design is illustrated more thoroughly in figure 2.

          Figure **2** is a schematic representation of a circuit for the invention. Additional  
15           features are included in the schematic to provide additional options that are contemplated in the design of the invention. Item **30** is the cadmium cell that controls a variable power control device, such as a transistor, SCR, or solid state relay or other switching device **50**. When the ambient light in the room decreases, the resistance of the cadmium cell will change and the switching device will begin to turn on. As the switching device turns on, the current will flow  
20           from the battery **80** through the transistor **50** and into the LED **20**. The power source, item **80**, provides electricity to the invention. In the preferred embodiment, the power source is batteries, but multiple other power sources are contemplated including power from a wall outlet, or other source capable of illuminating a light source. Item **110** is a silicon solar cell that collects ambient light from the room when external lighting is present. The solar cell collects light and  
25           converts the light into power that can be stored or used. A diode, item **120**, prevents the solar cell from discharging of the battery in low light conditions. In this design, the energy is stored in the battery item **80**. This circuit shows a switch, item **70**, that can be switched on or off to allow or prevent the light from turning on regardless of the ambient light intensity in the room. In figure 2 the switch is shown as a simple on-off switch. The switch could be replaced with a  
30           number or other types of switches including a motion sensor that would energize the circuit when motion is sensed near the invention. In another embodiment, the switch could be an

audible sensor that energizes the circuit when a sound detected. In still another embodiment, the switch could be a “touch switch” that turns on the light when the frame or artwork is touched. Multiple types of switches can be used to turn on and off the light(s) in the frame from a variety of sensors. The circuit may also be de-energized by turning off the light when the presence of someone is not detected, when no sound is heard, or when a period of time has passed. Resistor **100** provides a bias to the transistor that allows the light to begin to illuminate at a certain ambient light intensity. The value of this resistor can be adjusted based upon the frame configuration and needs of the customer. Resistor, item **90**, is a current limiting resistor that limits the amount of power to the LED item **20**. The current limiting resistor prevents the power source from providing excessive power to the LED that might reduce the life of the LED. Item **60** is a secondary output device that may be energized from the circuit. Optional features are contemplated that might be used by this feature. Possible uses for this feature might be a sound recording that describes the artwork or picture. Another use for this feature could be the picture of the parent of a child, and when external light in the room is turned off, the LED will turn on, and the pre-recorded sound of the parent in the picture may say “Good Night”.

Figure **3** is a cross section view of the invention that shows the frame of the picture item **10**. This cross section shows the components integrated within the frame. In another embodiment, a smaller standard picture or artwork may be mounted within a larger frame that contains the invention. If a smaller picture or artwork is placed within a larger frame, the smaller framed picture or artwork can be replaced or sold without the larger frame containing the invention. The opposite is also possible that the invention may be sold without the artwork or picture if the buyer has their own artwork they would like to install within the invention. The light source **20** is shown in this figure in front of the artwork **40**. In the preferred embodiment, the light source is directed down onto the artwork as shown in figure 3. Directing the light source down onto the artwork is done to maximize the light that illuminates the artwork. Item **140** may be installed to obstruct or bend a portion of the light. This obstruction may be a lens that defuses the light beam and focuses more of the light onto picture. The ideal light source would provide a wide angle of light with minimal diffusion of light away from the artwork or picture. If an ideal light source is not available item **140** may be used to increase the amount of light that shines onto the artwork. Item **140** may also be an image of something, and when the light is illuminated, the image is cast onto the artwork. Light sources from various vendors



provide different refraction qualities and illumination intensities. It may also be desirable with some types of artwork that the light source be a tight beam of light that highlights a certain portion of the artwork or picture. This may be particularly useful when illuminating the picture of a person or a portrait. Item **30**, is the light sensor. Once again, it should be noted that the sensor does not receive any light from the light source, item **20**. Item **130**, is a circuit board that the components are soldered. In figure 3, the power source is shown as a battery, item **80**. The battery is shown mounted on one side of the circuit board and the light source and sensor are mounted on the other side of the circuit board. This is shown for illustration purposes, and in another embodiment all the components may be mounted on the same side of the board. Other configurations are also possible where the sensors, light, batteries, and electrical components (not shown) may be mounted on either side of the circuit board.

Figure 4 shows an oval frame **10**, with multiple light sources **20**. In this configuration, the multiple light sources are used to provide more even illumination to the picture. This figure shows six light sources mounted within the frame. While six light sources are shown, there could be as little as one light source, to as many as the frame is capable of holding. A circuit board **130**, is mounted within the top of the frame and the light sensor **30**, is also in the top portion of the frame. The location of the sensor and the circuit board is shown as an example and the actual location of these components can be at any place within the frame. It is also contemplated that the invention could have multiple separate sensors and light sources that illuminate with varying light intensities. In this figure, the LED's are connected with wires that are soldered into the circuit board. In another embodiment, the circuit board may have the same shape as the frame, and multiple LED's all be soldered directly onto the circuit board. This could be useful for a picture of a city street where the first stage of darkness illuminates the picture with an overall light source, and as the room further darkens, another light source can be illuminated above a streetlight to give the illusion of the streetlight being illuminated.

Thus, specific embodiments and applications for illuminating a picture or artwork where the light source is integrated within the frame and the light source is located in front of the artwork or picture have been disclosed. It should be apparent, however, to those skilled in the art, that many more modifications besides those described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the spirit of the appended claims.